

Claims

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[c1]

A metal containment vessel for a boiling water nuclear reactor, the boiling water nuclear reactor comprising a reactor pressure vessel, said containment vessel comprising:

a bottom head;

a removable top head; and

a substantially cylindrical sidewall extending from said bottom head to said top head, said bottom head, top head and cylindrical sidewall defining a containment cavity sized to receive and enclose a reactor pressure vessel, said containment vessel having a pressure rating of at least about 50 atmospheres.

[c2]

A containment vessel in accordance with Claim 1 wherein said containment vessel has a pressure rating of about 150 atmospheres or less.

[c3]

A containment vessel in accordance with Claim 1 wherein said metal containment vessel comprises is a low alloy steel.

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[c4]

A containment vessel in accordance with Claim 1 wherein said containment cavity comprises a volume of less than 4 times a volume of the reactor vessel.

[c5]

A containment vessel in accordance with Claim 1 further comprising a drywell isolated from the reactor pressure vessel by a remotely actuated valve.

[c6]

A containment vessel in accordance with Claim 1 wherein said sidewall comprises a plurality of penetrations.

[c7]

A containment vessel in accordance with Claim 6 wherein said sidewall comprises at least one pipe guard enclosing at least one of said plurality of penetrations, said pipe guard draining into said containment vessel.

[c8]

A containment vessel in accordance with Claim 6 further comprising a plurality of isolation valves coupled to said sidewall penetrations, said isolation valves positioned inside said containment cavity and between said sidewall and the reactor pressure vessel.

[c9]

A containment vessel in accordance with Claim 1 wherein said bottom head and

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said sidewall are forged and machined into a substantially complete one piece unit at a location remote from the nuclear reactor.

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[c10]

A containment vessel in accordance with Claim 1 wherein said cylindrical sidewall comprises:

a thickness of at least about 15 centimeters; and
a thickness of not more than about 30 centimeters.

[c11]

A boiling water nuclear reactor comprising:

a reactor pressure vessel;
a reactor core located inside said reactor pressure vessel; and
a metal containment vessel, said reactor pressure vessel enclosed inside said containment vessel, said containment vessel comprising ;
a bottom head;
a removable top head; and
a substantially cylindrical sidewall extending from said bottom head to said top head, said bottom head, top head and cylindrical sidewall defining a containment cavity sized to receive and enclose said reactor pressure vessel, said containment vessel having a pressure rating of at least about 50 atmospheres .

[c12]

A reactor in accordance with Claim 11 wherein said containment vessel has a pressure rating of about 150 atmospheres or less.

[c13]

A reactor in accordance with Claim 11 wherein said metal containment vessel comprises is a low alloy steel.

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[c14]

A reactor in accordance with Claim 11 wherein said containment cavity comprises a volume of less than 4 times a volume of said reactor pressure vessel.

[c15]

A reactor in accordance with Claim 11 said containment vessel further comprising a drywell isolated from said reactor pressure vessel by a remotely actuated valve.

[c16]

A reactor in accordance with Claim 11 wherein said containment vessel sidewall

comprises a plurality of penetrations.

[c17] A reactor in accordance with Claim 16 wherein said sidewall comprises at least one pipe guard enclosing at least one of said plurality of penetrations, said pipe guard draining into said containment vessel.

[c18] A reactor in accordance with Claim 16 further comprising a plurality of isolation valves coupled to said containment vessel sidewall penetrations, said isolation valves positioned between said containment vessel sidewall and said reactor pressure vessel.

[c19] A reactor in accordance with Claim 11 further comprising an isolation condenser outside said containment vessel sidewall.

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[c20] A reactor in accordance with Claim 11 wherein said containment vessel bottom head and said containment vessel sidewall are forged and machined into a substantially complete one piece unit at a location remote from said support pad.

[c21] A reactor in accordance with Claim 11 wherein said containment vessel cylindrical sidewall comprises:
a thickness of at least about 15 centimeters; and
a thickness of not more than about 30 centimeters.